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## ABSTRACT

The Environmental Education Project Center has developed these guidelines for teaching a unit in environmental studies. It is their intention that the teacher and student cooperatively plan the approach and content to be used during the course of study. In this unit about land, teacher resource information and student material are combined to form a teacher's manual for use in the senior high grade levels. Project objectives, behavioral objectives, and pre- and post-test questions introduce the unit sections followed by ideas, actions, and/or activities to develop awareness of land and its uses. Major topics of discussion range from plants and animals associated with soil to litter, control measures, and resource use. Field trips emphasizing concepts previously learned are suggested and additional sources of information and materials for both students and teachers are listed. This work was prepared under an ESEA Title III contract for the project "Operation Survival Through Environmental Education." (BL)

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# ENVIRONMENT

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SENIOR HIGH

Idea I

Land

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## TEACHER MANUAL

Title III

ESEA

"Operation Survival Through  
Environmental Education"

Environmental Education Project

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Grafton, Illinois 62037

Phone 618-786-3313

# ENVIRONMENTAL IDEAS

## FOR THE STUDENT

-Land-

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# I N T R O D U C T I O N

to

## ENVIRONMENT Idea 1 Land

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### SENIOR HIGH SCHOOL RESOURCE UNIT

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The Title III Environmental Education Project Center is providing your class with the following materials to teach a unit on land.

Student Manuals - 1 per student  
Teacher Manual - 1  
Supplementary Materials (as requested by the  
classroom teacher)

It is the project's intention to provide guidelines for the teacher and student to cooperatively plan the approach and content to be used during the course of study. All or part of the material can be used after evaluating the needs of the students.

The Environmental Education Project is evaluated by meeting objectives as outlined in the original project proposal. The resource units are written to meet these project objectives with additional material deemed necessary by the project staff, area teachers and administrators, and local environmental concerns.

A summary of the project objectives is provided to inform you of the area being evaluated concerning the land unit.

- decrease in leaf burning
- decrease in use of trash burning barrels
- decrease in burning off areas of vegetation cover on fields
- decrease in use of pesticides in the homes, the gardens, and the fields
- decrease in the number of pounds of litter on a 50 foot section of the banks of Wood River Creek

- increase in use of litter bags in automobiles
- increase in the purchase of soft drinks in returnable containers
- increase in use of books and magazines relative to environmental problems checked out of school libraries and instructional centers.
- increase in classroom use of films and filmstrips on environmental education
- increase in number of subscriptions to periodicals and other publications relative to environmental education

Students and families of students involved in the project are evaluated on the basis of the above stated objectives. Any different approach that you and/or your students might conceive that will further develop these objectives will be most welcome at the Project Center.

A concept-activity file is constantly being formulated at the Project Center to supplement the resource unit. Additional activities should be evaluated and used to increase motivation and interest depending on the students' background.

The concepts as stated in the original proposal are further stated in the field trip section. These concepts are primarily concerned with the land unit. Additional concepts should be developed to meet the needs of the individual teacher and students at the appropriate grade level.

Behavioral objectives are necessary to devise a method of evaluation and proper instruction. The following behavioral objectives are listed as a basis to follow in the teaching of the land unit. Additional objectives should be devised by the teacher as they apply to the individual needs of the students.

1. Students will be able to give reasons why man must use his resources wisely.
2. Students will be able to list reasons why hard pesticides are dangerous to plants, wildlife, and man.
3. Students will be able to write an essay comparing the pros and cons of the literature on pesticides.
4. Students will list possible solutions to the solid waste problem.
5. Students will design a recycling system and successfully carry out the program for a given period of time.

A pre-test and a post-test must be given to each student. Included are a student test, which may be duplicated by the teacher, and a teacher's answer sheet.

After completion of the pre- and post-test, please grade and fill in the testing information as indicated on the teacher evaluation form.

# ENVIRONMENTAL IDEAS

## FOR THE STUDENT

### -Land-

#### Teacher's Answer Key

Grade the student responses using the following key. Look for key words or phrases and be flexible. The answers given are only possible suggestions. The students will surely give additional answers that are correct. Point values are placed in parenthesis before the question. Tabulate the results of the pre- and post-test and submit them to the Title III Environmental Education Center on the teacher evaluation form.

- (10) 1. What natural resources are being misused at the present time?

ALMOST ALL RESOURCES ARE BEING MISUSED. AIR, LAND, AND WATER ARE BEING POLLUTED. FOSSIL FUELS AND MINERAL RESOURCES ARE BEING DEPLETED AT A RAPID RATE.

- (10) 2. Comment on this statement: Wildlife is a precious, but unnecessary, resource.

WILDLIFE IS A VERY NECESSARY RESOURCE FOR THE SIMPLE REASON IT HELPS MAINTAIN A BALANCE IN NATURE; e.g. CONTROLS, FOOD SUPPLY, AND RECREATION.

- (15) 3. Give an example of a food chain and how the use of pesticides might effect the food chain.

ALGAE IN WATER SUPPLYS ABSORB PESTICIDES FROM FIELD RUN-OFF. THEN FISH EAT THE ALGAE AND THE PESTICIDE ACCUMULATES IN FAT TISSUE. THIS ACCUMULATION OF PESTICIDES CAN BE INJURIOUS TO ANIMALS THAT FEED ON THE FISH, e.g. THE BALD EAGLE.

- (10) 4. Write three statements for the use of hard pesticides and three statements against their use.

FOR HARD PESTICIDES	AGAINST HARD PESTICIDES
A) CONTROLS PESTS	A) ACCUMULATES IN FAT TISSUE
B) INCREASES CROP YIELD	B) CAUSES HARMFUL CHANGES IN THE PHYSIOLOGY OF THE ORGANISM
C) MORE EFFECTIVE THAN NATURAL CONTROLS	C) ORGANISMS ACQUIRE IMMUNITY
	D) KILLS BENEFICIAL ORGANISMS

- (10) 5. If you had the sole responsibility of maintaining a lawn and a home garden, what natural controls of pests could you use in place of pesticides?

CONSULT THE HANDOUT ON NATURAL CONTROLS AND PESTS INCLUDED IN THE TEACHER PACKET. SUCH CONTROLS MIGHT INCLUDE; COLORED LIGHTS, ELECTRONIC EQUIPMENT, PLANTS, PREDATORS, AND SEX ATTRACTANTS.

- (12) 6. Choose one letter (a-e) from the answer key and place it to the left of the statement.

KEY: a) aluminum can  
b) tin can  
c) glass container  
d) none of the above  
e) all of the above

  d   burned effectively in incinerators

  b   biodegradable

  e   recycled economically

  d   good substance to use in compost heaps

  d   self-destructs at pre-arranged time

  c   basically made of unlimited natural resources

- (5)   b   7. The ideal situation concerning the effects of glass containers on the environment is:

- a) return non-returnable containers to glass manufacturers for recycling
- b) buy only returnable bottles, then return them for refund of deposit
- c) discard non-returnable containers to be compacted and covered with dirt at a sanitary landfill.

- (5)   e   8. Choose the statement that explains why people litter.

- a) They are careless, thoughtless, inconsiderate, and lazy.
- b) They don't carry litterbags in their cars or boats.
- c) They are not interested in aesthetics.
- d) There are too few litter baskets along streets and highways, at beaches, campsites, and picnic grounds.
- e) All of the above statements apply.

- (5) c 9. You are riding in a car with a group of fellow students. You have just finished a cool, refreshing soft drink that you bought in a non-returnable bottle. What should you do with that empty bottle?
- a) throw it out the ~~car~~ window (while no one is looking)
  - b) keep it until you find a receptacle
  - c) take it home and put it with the other glass containers you are saving to return to a glass manufacturing company.
- (5) a 10. You are faced with the decision of choosing a container that your favorite soft drink comes in. Three choices are available, which should you choose? Explain your choice.
- a) non-returnable bottle (save and receive \$20 a ton at local glass manufacturing factory)
  - b) aluminum can (save and receive \$200 a ton at distant aluminum factory)
  - c) tin can (throw away at closest receptacle to be buried and decomposed at sanitary landfill)
- (13) 11. There are always two sides to every situation. Population control is no exception. Give three statements for and three statements against governmental birth control in the United States. Explain and support your statements.

THE ANSWER WILL VARY ACCORDING TO THOSE TOPICS RESEARCHED BY THE STUDENTS. WHAT IS IMPORTANT HERE IS THAT EACH STUDENT CAN RECOGNIZE BOTH SIDES OF THE POPULATION SITUATION.

# ENVIRONMENT

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Idea 1  
Land

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## ENVIRONMENTAL IDEAS FOR THE STUDENT

This guide to environmental ideas is written for you in order to provide a better understanding of some of the environmental problems facing mankind today. It is also written in such a way that you will be able to make your own value decisions about what has to be done to maintain and improve the world in which you and all of us live. The interest that you have is directly related to the amount of involvement that you give in the solution to the problems of our surroundings.

This guide will be used by other students after you. Please keep it in good shape and avoid marking in it. Use notebook paper for answering questions, copying charts, or other tasks called for on the following pages.

## ENVIRONMENT

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Idea 1  
Land

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Action 1

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Which Way America...Up or Down?

According to the National Wildlife Federation, the answer is **DOWN**. Starting in 1969 the National Wildlife Federation published an Environmental Quality Index. Each year this E.Q. Index evaluates the quality of our natural resources: air, water, wildlife, timber, soil, minerals, and living space. If these resources are in trouble, what caused this problem to exist?

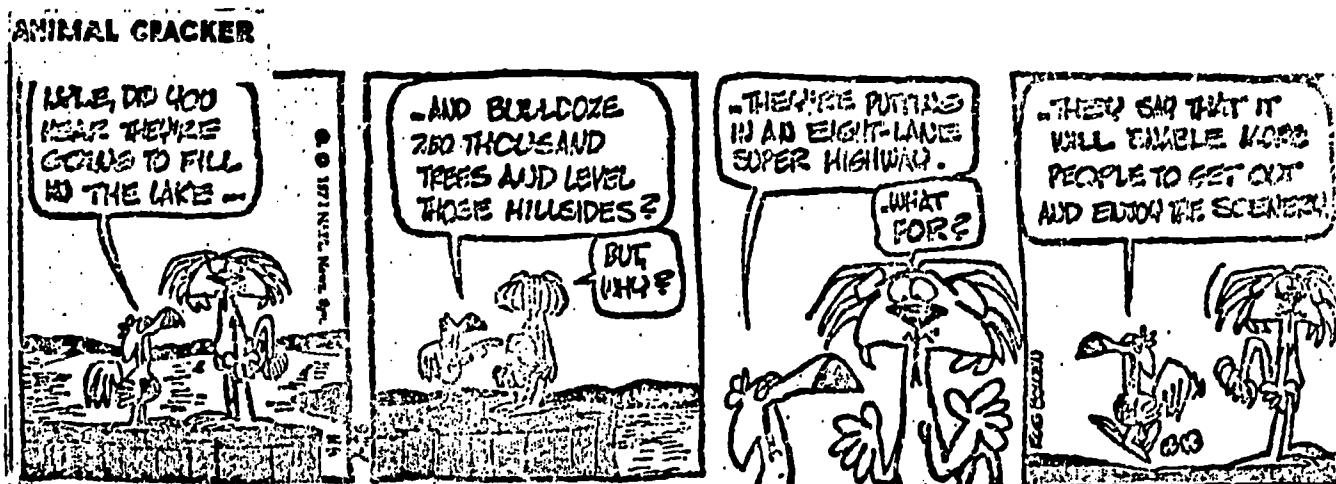


## A. Look It Up!

The problem must be identified. You can identify the problem and suggest reasons why the problem exists by conducting research. You and your teacher should determine what approach you should take for researching this area. Possible suggestions are:

1. Each student be assigned a specific area to research; e.g. wildlife, timber, soil, or other land areas.
2. Groups of students can work together on a specific area.
3. Take a new approach, such as taking slides or photographs, making a drawing, or other methods.

When conducting research, use all available material; such as books, magazines, and filmstrips. Also look at both sides of the problem. Do not rely entirely on environmental literature. Your teacher will have a list of good resource material available for student use. Survey your library and instructional material center. The problems you are looking for all pertain to land (wildlife, timber, soil, minerals, and living space).



## B. True or False?

Choose one or two of the following statements and make comments. Now that you have some background information about the problem (after research), suggest reasons why the problem exists and possible solutions to the problem.

1. Any amount of garbage is all right, just don't litter.
2. There were 102 animal species on the endangered list in 1970.
3. The Asians won't starve, as long as I eat everything on my plate, and we harvest the sea.
4. A half million acres of farmland are lost to pavement annually.
5. Man has always had problems, and he'll always be able to solve them through science and industry.
6. One cloverleaf interchange takes 40-80 acres of land.
7. Wildlife is a precious, but unnecessary, resource.
8. Driving to school is approved, if I am licensed, permitted by my parents, and safe.
9. Standard of living is based on annual income and purchasing power.
10. The history of man is the history of his growing mastery over nature.

### C. Use Those Resources Wisely!

The quality of our environment can be improved if all of us join together and assume the responsibility. You can originate solutions or find lists of positive steps to take; however, the actual accomplishment is most important.

After researching the problems that exist and the reasons why they exist, establish one or two workable approaches to solving the problem and carry them out. A thorough knowledge of the approach taken is necessary to do a good job.



# TEACHER'S GUIDE

## ACTION I

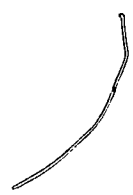
For factual information concerning the National Wildlife Federation's Environmental Quality (E.Q.) Index, consult the Oct.-Nov., 1970 or 1971 issue of the National Wildlife magazine or the Title III Center for a copy of the E.Q. Index.

Part A: Use your own judgement on what approach should be taken to research the areas suggested by your students. Most important is to get their interest by letting them research their own area of interest.

Part B: The statements presented can be categorized as either true or false, but this is not the important thing. The comments made by the students will be either environmentally correct, incorrect, or partially correct or incorrect.

Brief comments on each statement follow:

1. False misconception. We should try to reduce the amount of garbage so that the solid waste problem would be lessened. Also, don't litter!
2. The list of endangered species is increasing. Some students will not appreciate the aesthetics of the preservation of animal species; however, have students compare the extinction of species and man's existence.
3. How many times have we told our children, "Eat everything on your plate, think of all the starving children without anything to eat."? The development of this statement can be quite lengthy and touchy. Handle with care!
4. True. How does this loss of acreage affect the total world production? See what the literature has to say about this!
5. This statement sounds promising. There is doubt that "everything" can be solved through science and industry, although many can be solved. The whole idea here is to first try to reduce the problems.
6. This discussion could lead to many controversial topics; e.g., alternatives to the internal combustion engine, or population growth. The completion of the interstate system of highways should prevent great acquisition of additional land for cloverleaf interchanges.

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7. Wildlife is necessary and precious. It is necessary to maintain the balance that occurs in nature.
  8. Driving to school is definitely a privilege to a newly licensed 16 year old, but is it environmentally sound to do so?
  9. Standard of living should be based on how an individual maintains a quality environment. The ability to use resources wisely and to save them both economically and environmentally is necessary to help maintain this quality environment.
  10. Past history has shown this to be the common goal for humanity; i.e. mastery over nature. Since we are part of nature, we should learn to live with nature, not above it.

Statements 1,3,5,7,8,9, and 10 were taken from:

Teaching for Survival

Mark Terry

Ballantine Books, Intex Publisher,  
New York

Statements 2, 4, and 6 were taken from:

E.Q. Index (one free upon request)

National Wildlife Federation

Educational Servicing

1412 16th St. N.W.

Washington, D.C. 20037

Part C: Any positive ideas developed by the students should be an integral part of this lesson. The motivation created by the students' accomplishment in a particular task is quite rewarding. Students should be encouraged to pursue these positive goals.

## ENVIRONMENT Idea 1 Land

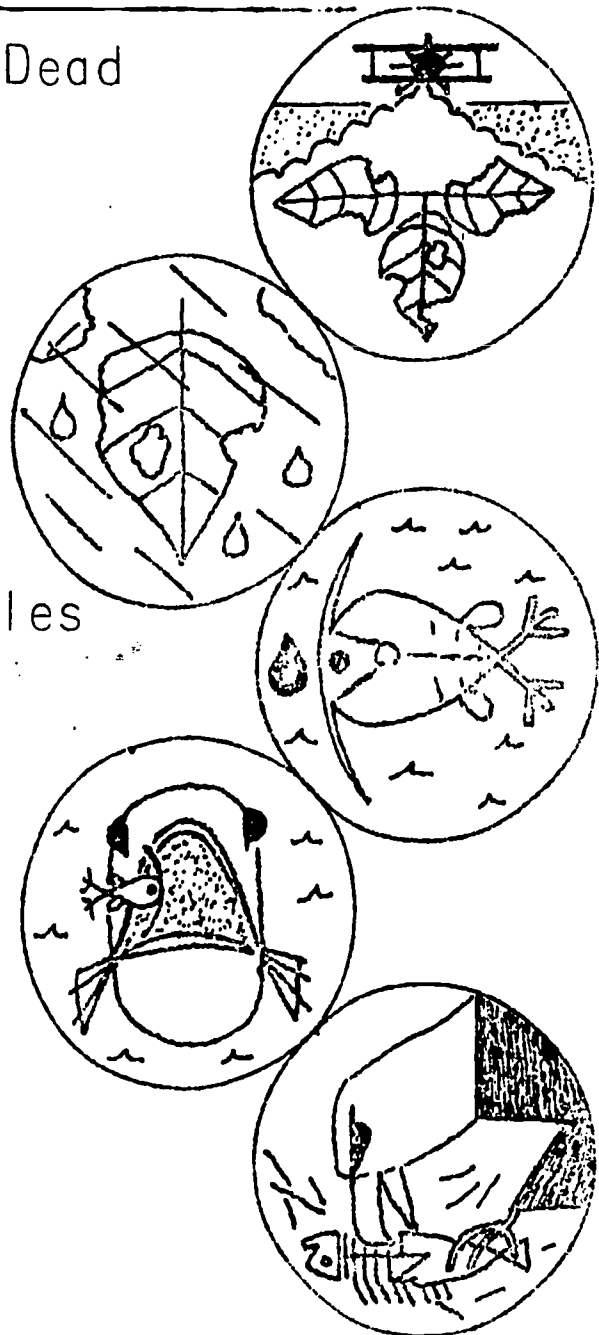
### Action 2

#### Kill 'Em All Dead

A controversy exists over the use of pesticides. What's wrong with pesticides? How much pesticide accumulates in the food we eat and what effect does it have on our bodies? Should the use of pesticides continue as it has for the last ten years? Should the complete withdrawal of pesticides from the market start immediately? Is there a better way of controlling pests?

#### A. The Trouble With Eagles

The eagles, and other animals, are in trouble because of pesticides. To understand why they are in trouble, we must know some ecology. The diagram on the right illustrates a food chain. Divide the class into five groups. Each group discuss for five minutes one circle at the right. After five minutes, have a spokesman explain to the entire class what is happening in the circle. How does this simple illustration help us understand the complex problem of too much pesticides in our environment? What kind of biological effects do pesticides have on plants, animals, and man?



## B. Do You Believe Everything You Read?

A tremendous amount of literature has been published lately on pesticides. Some of this literature is valuable and some is not. Some of the literature supports the use of pesticides and some does not support its use. Propaganda is found in all our literature. If there are so many different views on pesticides, what can we believe when reading this material?

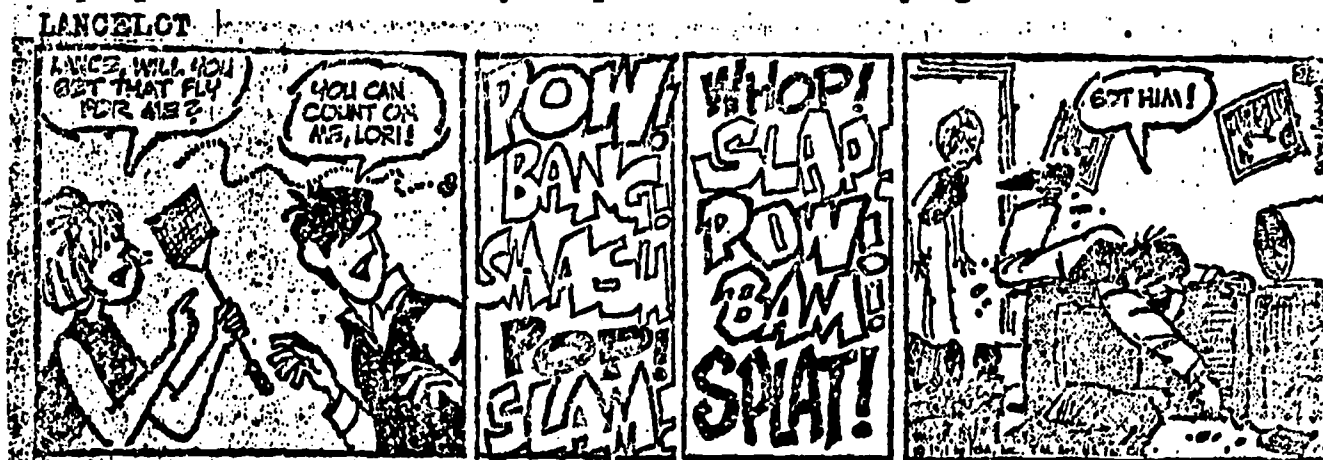
Your teacher will provide you with some literature on pesticides. You should survey the library and/or IMC for information concerning pesticides. Your local newspaper and the magazine you receive at home should have articles about pesticides. Critique all the available information and literature.

Look for bias opinions in the literature. Who wrote the article? What part does big business play in the use of pesticides? Do politicians take a definite stand on issues concerning pesticide use? Invite resource people to speak to your class about pesticides. What stand do they take?

## C. Nature Provides Pest Controls

Both plants and animals can control pests in your garden and around your home. If your parents are still using dangerous chemical pesticides, see if you can convince them to try less dangerous chemicals and/or natural controls. It is very easy to say this but very difficult to actually influence your parents, relatives, and friends to change what they have been doing for years.

Let's evaluate the situation and design a good plan of attack! You have researched the literature and should have a general understanding of the problem. Using this knowledge, list what methods would be most valuable to cause a change in attitude and in the use of pesticides. Work individually, in groups, or as an entire class. Make sure you know what alternatives are available. Be prepared to work with your parents while trying new methods.



Behold this compost!  
behold it well!

Perhaps every mite has once formed part of a  
sick person--yet behold!

The grass of Spring covers the prairies.

The bean bursts noiselessly through the  
mould in the garden,

The delicate spear of the onion  
pierces upward,

The apple-buds cluster together on the  
apple-branches.

The resurrection of the wheat appears  
with pale visage out of its graves.

What chemistry! That the winds  
are not really infectious,

That all is clean, forever and forever.

That the cool drink from the spring tastes so good,

That blackberries are so flavorful and juicy,

That the fruits of the apple-orchard and the orange-orchard,

That melons, grapes, peaches, plums, will none of them poison me.

That when I recline on the grass,  
I do not catch any disease.

Now I am terrified at the Earth, it is that calm  
and patient,

It grows such sweet things out of such corruptions,

It turns harmless and stainless on its axis, with such endless  
succession of diseased corpses,

It distils such exquisite winds out of such infused fetor,

It gives such divine materials to men,  
and accepts such leavings from them at last.

-Walt Whitman

# TEACHER'S GUIDE

## Action 2

Part A: A summary of ecological principles is very beneficial at this point. To understand that everything is connected to everything else is essential in order to know how pesticides effect the biological phenomenon. Pesticides often kill the pests as well as other harmless and beneficial plants and animals. Just as the illustration points out, pesticides once used will travel over a wide range and effect animals indirectly. Rain will wash pesticides off the fields into the streams where microorganisms absorb it into their tissues. Larger fish eat great quantities of these microorganisms; building up the concentrations of pesticides in their tissues. When a bald eagle eats the weak or dead fish, it will accumulate this pesticide in its system. This can either kill the eagle or cause the eggs to have a soft shell and not hatch. This is the trouble with eagles.

Part B: A citizen's ability to analyze the literature is of great importance. A student needs this training to operate as an effective, responsible citizen.

The articles in the teacher's packet of supplementary materials can be Ditto mastered and distributed to the students. You might want to find your own articles or have the students bring them in. The four articles in the teacher's packet present varying views on the use of pesticides. Everyone should read and evaluate "A Positive Perspective on Pesticides".

Part C: A handout on natural controls would be helpful at this point. Evaluate the effectiveness of using biological controls instead of buying commercial fertilizers and pesticides. Designing a handout or handbook on pests and natural controls is helpful in getting the message across to parents.

## ENVIRONMENT Idea 1 Land

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### Action 3

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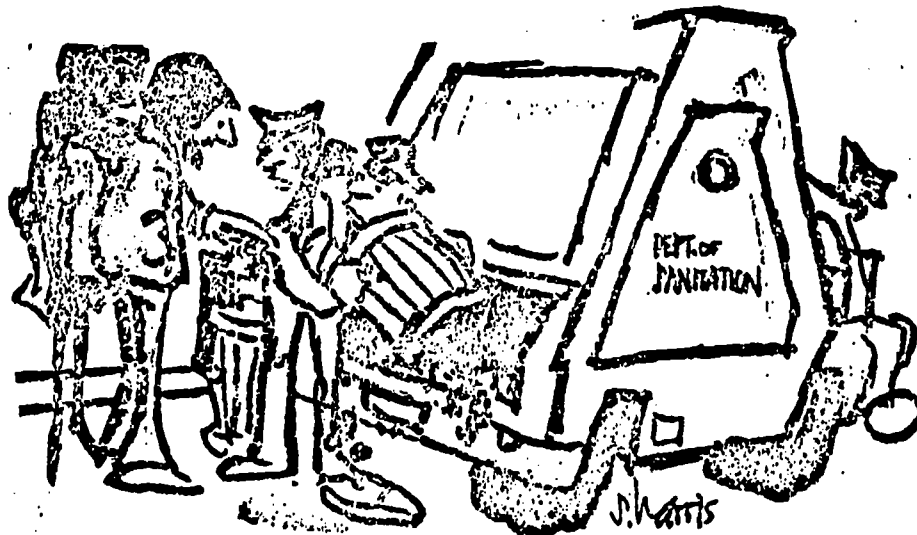
#### Man, We Need Changes

There are too many people causing too much solid waste.

There is too much convenience packaging that causes too much solid waste.

There is a lack of proper attitude among people about the solid waste problem.

We need changes and we need them now!



"YOU SIMPLY SEPARATE ALL THE ORGANIC STUFF AND BURY IT, FLATTEN TIN AND ALUMINUM CANS FOR RECYCLING, BUNDLE YOUR PAPERS, REMOVE THE PLASTICS..."

## A. The Facts

You must know the facts before change takes place. Your teacher will provide you with some facts about solid waste, litter, and solid waste disposal practices. This information will be limited, so look for additional information about statistics concerning the solid waste problem.

Another source of information is a resource person. Some suggestions on whom to invite are:

COUNTY SANITATION OFFICER  
PUBLIC HEALTH OFFICER  
INDUSTRIAL RECYCLING OFFICER  
INTERESTED CITIZENS

Your teacher has a list of resource people in your community and surrounding area.

Some of the factual information you are looking for will include:

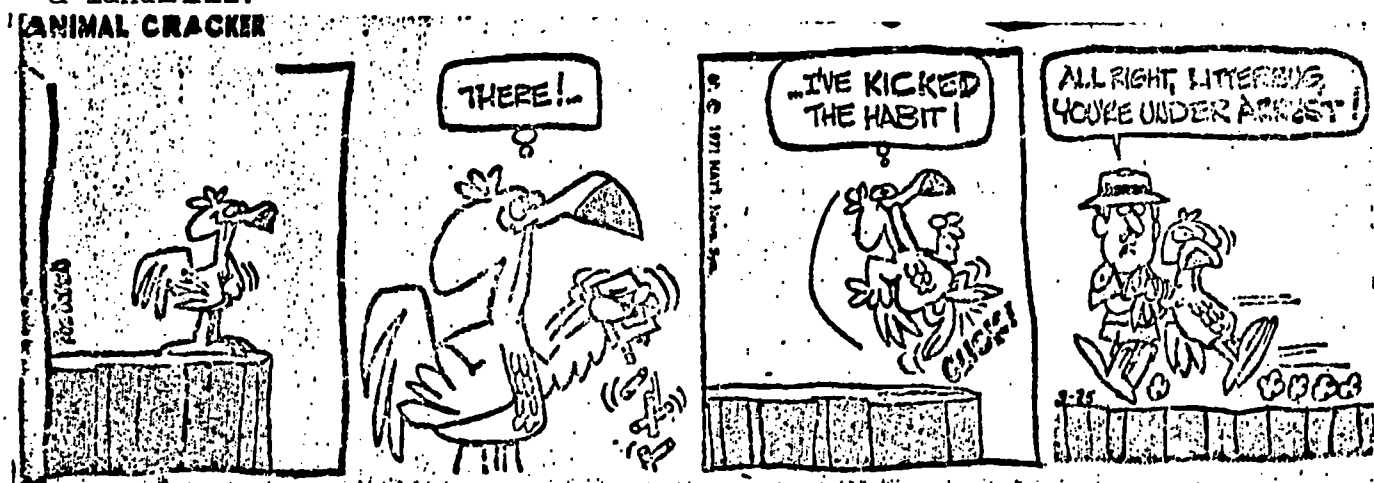
- THE AMOUNT OF SOLID WASTE
- THE PROJECTED INCREASE OF SOLID WASTE IN THE NEXT TEN YEARS
- WHO CAUSES THE SOLID WASTE PROBLEM
- ADVANTAGES AND DISADVANTAGES OF THE PRESENT DISPOSAL METHODS
- HOW YOUR COMMUNITY DISPOSES OF SOLID WASTE
- YOUR COMMUNITY'S FUTURE PLANS.



## B. We Can Work It Out

The most common method of disposal is the open dump. This is not an acceptable method for many obvious reasons.

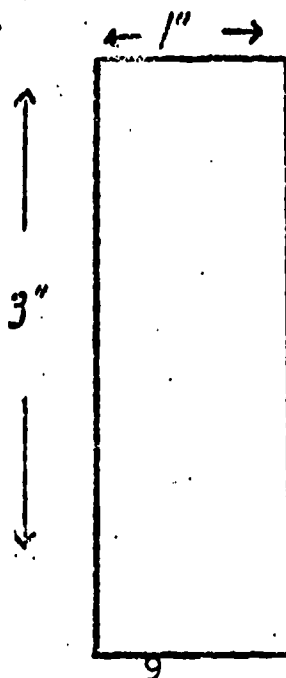
A better method than open dumping, that is becoming very popular, is the sanitary landfill. This method involves compacting the solid waste and covering it with a thin layer of dirt each day. There are advantages and disadvantages of this type of operation. Let's run an experiment to see what materials should be placed in a landfill.



## Biodegradable Substances in a Landfill

Cut four strips, one by three inches, of one of the following items:

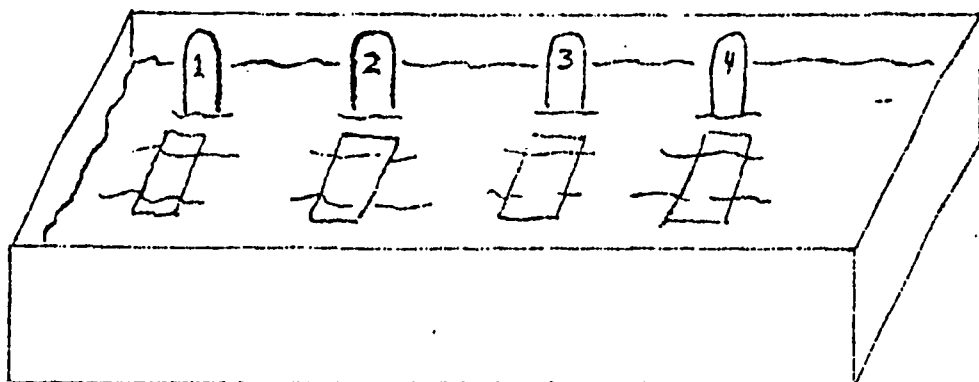
Saran wrap  
Cellophane  
Envelope "window"  
Candy wrapping  
Hard plastic  
Styrofoam  
Rubber  
Carbon paper  
Various food items  
Tin can



Facial tissue  
Paper towel  
Typing paper  
Ditto paper (with purple wax)  
Notebook paper  
Glossy magazine cover  
Corrugated cardboard  
Label paper from tin can  
Aluminum foil

Collect garden soil in a deep tray, bread pan, or milk carton cut lengthwise. You might want to experiment with different types of soil. You will also need four markers, such as ice cream sticks.

Keep the soil moist but do not allow water to stand. Keep the samples at room temperature.



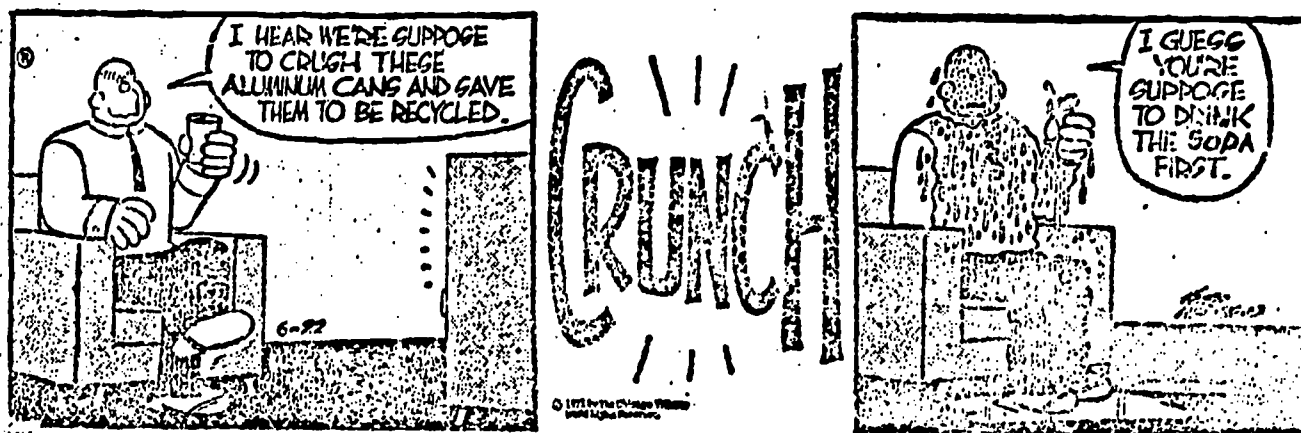
Observe and record on the data sheet provided by your teacher, the characteristics of the material used. Then bury and mark the four items in your garden soil. After each week, dig up one item and observe its appearance. CAUTION: do not disturb the other buried items. Look for the roughness of the surface as well as tiny holes or Swiss cheese-like holes, and complete disintegration.

After completion of this activity, answer the following questions:

1. Which samples disintegrate rapidly? Which show very slow disintegration?
2. Make a list of the samples going from the most actively disintegrated to the least easily disintegrated.
3. From the above list, what material should be recycled by salvage?
4. List some problems that occur at a landfill operation.
5. List problems to consider before a community initiates a landfill operation.

Another method of disposal is incineration. Incinerators are usually found in large cities where space is limited. Many problems of solid waste disposal can be eliminated if an incinerator is properly operated.

None of the above methods of disposal are environmentally acceptable. The reason for this is that none have a complete recycling plan. A recycling system is a positive approach toward the solution of the solid waste problem.



### C. We Must Work Together

It is everyone's responsibility to see that valuable resources are used over and over. The following categories of solid waste practices can be started at home. Discuss each category separately and carry through by actually performing the task at your home and school. Try to determine the monetary value of each item in the categories.

RETURNABLE VS. NON-RETURNABLE CONTAINERS  
COMPOSTING FOOD WASTE AND ALL ORGANIC WASTE  
RECYCLING GLASS, PAPER, CANS, ALUMINUM, AND LARGE METAL OBJECTS  
REUSING OR RECYCLING PLASTICS

You probably discovered that it is difficult to place monetary values on many items. It is debatable whether a monetary value can be placed on the destructive effect various things have on the environment.

Every individual can practice environmental housekeeping. However, the majority does not practice this. What reasons can you give for this? How can we get more people to think environmentally? What are the possibilities of a complete recycling program on a community-wide basis?

# TEACHER'S GUIDE

## Action 3

Part A: A transparency is provided so that you can give your students some facts about the solid waste problem in the United States. Also a brief description of problems involved with present solid waste disposal practices is included.

### I. Criteria for ideal solid waste disposal:

- A. Complete recycling program
  - 1. home separation
  - 2. community collection centers
  - 3. salvage at disposal site
- B. Composting of organic waste
  - 1. individual responsibility
  - 2. community program
    - leaf collection
    - compost heap
    - use as fertilizer by citizens
- C. Additional items, especially plastics
  - 1. never open burn
  - 2. bury or incinerate completely

### II. Less than ideal disposal methods would be incineration or sanitary landfill. Problems that should be considered are

- A. Pest Control; i.e. rodents, flies, pathogenic bacteria
- B. Odor
- C. Air and water pollution
- D. Appearance; e.g. windblown litter
- E. Economics

Part B: The experiment is basically self-explanatory. The whole idea of the experiment is to allow the students to realize that some materials should not even be placed in a land-fill; e.g. those items that will be with us "forever."

Students could devise their own experiments to illustrate the use of an incinerator. For example, one experiment could show how some materials burn completely while others just melt or do not burn at all.

Additional information and experiments can be obtained from the Title III Environmental Education Center, phone 618-786-3313.

Part C: A poster on how to prepare and maintain a compost pile is available free from:

Environmental Action Bulletin  
Rodale Press, Inc.  
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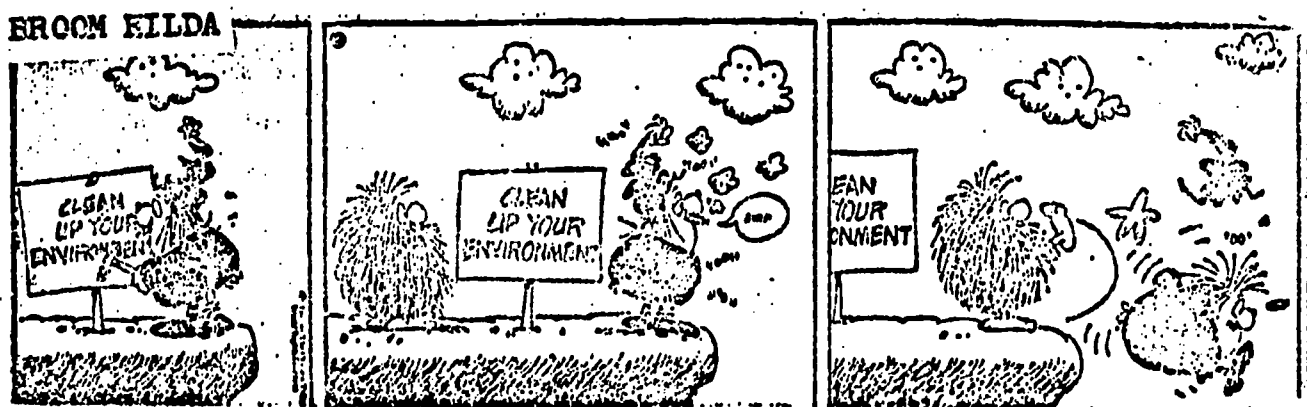
Ask for Bulletin Number 4, Volume 9, January 23, 1971.

## ENVIRONMENT Idea 1 Land

### Action 4

#### The Problem With People

If you had a choice, which would you take? One million dollars in cash, or one penny, doubled each day, for thirty days? How does this relate to population?



#### A. Do We Have Enough Food?

You might think that you have enough food for your personal needs, but what about the rest of the world? Food increases arithmetically, and population increases geometrically. Let's set up a model to illustrate this mathematical relationship.

Suppose you started with ten starlings--five males and five females. Each year these bird pairs each produce ten offspring, always half males and half females, and the parents die before the next season. During the next seven years, there is neither immigration nor emigration. Therefore, if we start with five pairs which have ten offspring the first year, the beginning of the second year we would start with fifty birds. These fifty birds, twenty-five pairs, produce ten offspring each, so the next season you would have 250 birds. Continue with this arrangement until seven years have been completed.

Your teacher will help you plot these numbers on semi-log graph paper. The vertical axis should represent the number of birds, and the horizontal axis represents the years. This graph will have a geometric curve. However, food production increases arithmetically; that is 1,2,3,4, and so on. If population growth is geometric, how will this affect food consumption if food production increases only arithmetically? Study the problem!

## B. Limiting Factors

How is consumption related to population size? Are food and space limiting factors? Let's set up an experiment to find out the answers to the above questions.

Drosophila are interesting little fruit flies. They grow and reproduce in a short period of time. Four fruit flies, two males and two females, are placed in a pint size container with a cotton plug and a nutrient medium in the bottom about  $\frac{3}{4}$ " thick. At least once a week, count the flies and record the data on the sheets provided by the teacher. Continue this technique for approximately eight to ten weeks. Your teacher will demonstrate the technique of counting and recording the flies. Plot the number of flies on the vertical axis with the weeks on the horizontal axis.

A discussion of the results should follow as directed by your teacher. Also information concerning relationships with humans will also be provided for discussion purposes.

## BROOM HILDA



## C. Stop At Two!

Such a statement appears ridiculous today, but it may happen in the future. That is, the number of children in a family may be limited by court decisions or legislative action. Even today, population growth rate is considered a major economic problem by many nations.

In an effort to improve or maintain economic conditions, some nations have initiated programs offering free family planning services. In July, 1970, Congress passed the Tyding-Schuer-Bush legislation. (S.2108) (H.R. 11550) This law authorized the spending of nearly \$1 billion over a five year period to extend free family planning services to all Americans.

For a better understanding of the problems associated with population, choose a topic on the following page and prepare a report. You may want to do this individually or in groups.



Legality of Governmental Population Control

Economy, Population, and Use of  
Natural Resources

Zero Population

Social Pressures and Population Control

Tyding-Schuer-Bush Legislation

Natality and Mortality of Socio-economic  
Groups

World Population Policies

Future Food Sources

## TEACHER'S GUIDE

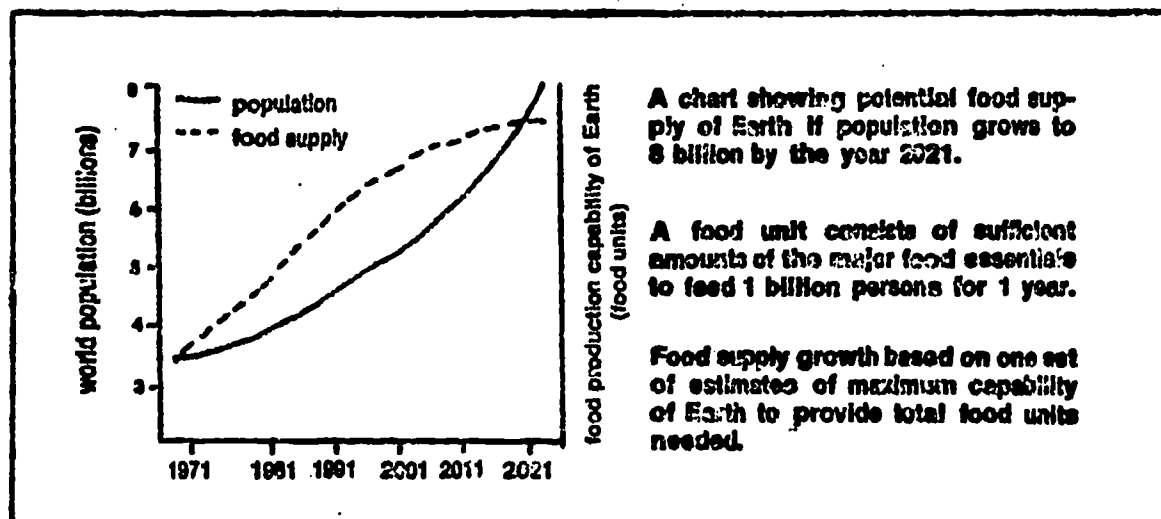
### Action 4

You will have more money at the end of the thirty days if you choose the penny doubled each day. Have the students work this out on paper. Your final figure should be \$5,368,709.12. It relates to population by illustrating a geometric curve using the penny doubled each day for thirty days.

Part A: Your final numbers should be:

Year	Bird Population
1	10
2	50
3	250
4	1,250
5	6,250
6	31,250
7	156,250

If you relate this to a chart on food productivity and population, it would look like this:



Part B: The purpose of this experiment is to demonstrate the population growth and decline of a macroscopic organism, Drosophila melanogaster, within a limited environment and to stimulate discussions of the similarities and differences of the same dilemma facing the human species, Homo sapiens.

You should order Drosophila and nutrient medium several weeks in advance. To count the Drosophila, you can use one of two methods:

1. Cooling Method

Materials for Each Student: Transfer Bottle (Optional)  
Petri Dish  
Cooling Container  
Crushed Ice (Or Ice Cubes)  
Pencil

This method uses ice (cubes or crushed) to immobilize flies so that they might be transferred and counted. First one transfers the flies from the culture bottle to another one-half pint container (transfer bottle). This is performed by tapping the culture bottle firmly on a book or notebook to force the flies to the bottom of the jar. Lids of both bottles are removed and the empty transfer bottle placed on the culture bottle. The bottles are then inverted with the culture bottle on top and the transfer bottle on the bottom. The flies are then firmly tapped down into the transfer bottle and the lid is placed on it. (Several problems may occur at this time. If the medium is too soft it may slide down the side (or fall from the bottom if too dry) and kill the flies. Special care should be taken to prevent this problem. The sides of the jar may also become so sticky that the flies won't fall out of the jar. In that case, the living flies must be counted both within and outside the bottle).

The transfer bottle may then be placed in a narrow container which is filled with ice water to a point just below the lip of the bottle. Care should be taken to prevent water from flowing into the transfer bottle and drowning the flies. Within a couple of minutes, the flies will be immobilized (but not dead) and will be ready to transfer for counting. To prepare for counting, the bottom of a petri dish should be filled to the top with crushed ice and the top placed on it making sure it is in contact with the ice. The flies may be taken from the transfer bottle and sprinkled on to the "cooled" petri dish top. The cool top will keep the flies immobilized while counting them. A piece of white paper should be placed under the petri dish to make the flies easier to see.

To count the flies, the student uses a pencil for a "pusher". Counted flies are moved with the sharpened end of the pencil into a group somewhat removed from those that are yet uncounted. Care must be taken to prevent killing the delicate flies with the pencil point.

The flies are then transferred back into the culture bottle. This is accomplished by pushing the flies from the top of the petri dish (notebook paper works fine) into the trough of a 3" by 3" piece of paper whose sides are at a 45° angle. The flies may then be transferred from the folded paper into the culture bottle. Transfer should be made while the bottle is lying horizontally or raised only slightly from the horizontal. The flies should be permitted to awaken before the bottle is placed in a vertical position. The horizontal placement is necessary because of the condition of the bottle and the physical makeup of the fly. If the flies are permitted to fall to the bottom into the moist medium, their membranous wings will stick and the fly will finally die with its wings pasted to the medium.

If transfer bottles are not readily available, the flies may be cooled in the culture bottle and sprinkled directly on to the counting dish. Frequently, however, animals fall to the bottom of the bottle only to be caught in the medium and die as mentioned above.

## 2. Ether Method

The materials used are identical with the exception that ice is replaced by ethyl ether. Ethyl ether is sprinkled on a piece of cotton attached to the bottle cap of the transfer bottle. The transfer bottle becomes an etherizer. Great care should be taken to prevent over-etherizing the animals. This may be prevented by carefully observing the flies within the transparent bottle. As soon as the last fly stops moving its legs, all animals should be placed onto a flat, counting surface (a table top is fine but once again, the background should be white). A petri dish lined with cotton may act as a re-etherizer in case flies start to awaken. The biggest drawbacks to this method are the cost of ether and the tendency to kill flies by overetherizing them.

## DISCUSSION

### Changes Within The Bottle

#### Changes Within The Medium

As the numbers grow, the medium becomes very moist (even semi-liquid) because of the large number of larvae in the medium. The increased moisture is because of a combination of the larvae feeding in the medium and their respiratory heat production. Sometimes the temperature of the bottle will even increase noticeably. As time progresses, large numbers of adult flies die and fall to the bottom of the bottle where they start to decay. The medium fills with waste matter of flies and decreases in depth due to the utilization of moisture by the flies and a generalized drying which occurs. The medium continues to dry and will eventually form a hard pellet, but this occurs long after all the flies have died. By the time all flies have died, the stench of death and decay is almost unbearable.

#### Changes On The Sides Of the Bottle And the Bottle Cap

The observer immediately notices materials being deposited on the sides of the bottle--so-called fly specks (waste) and eggs (thin and thread-like). No longer is there room for deposit of all eggs on the proper habitat, the medium. As time progresses, the sides of the bottle become more fouled. Wastes are deposited in particularly large numbers at the top of the bottle and underneath the bottle lid where they may build up to a depth of a centimeter or more. The sides of the bottle also become very sticky due to the movement of medium from the bottom of the bottle.

#### Fly Population-Numbers--Behavior

The fly population increases to a maximum of 300 flies with the average usually about 200 individuals. If counted frequently enough, the S-shaped growth curve of a typical growing population will emerge. Even if counting is done infrequently, the major features of the curve will be indicated.

The adult fly behavior changes rather dramatically as the population grows. They spend less time flying and more time walking. They also spend more time crowded together at the top of the bottle to escape the less desirable environment in the lower portions of the bottle. As the population becomes larger, and the food supply dwindles, the larvae and adults become noticeably smaller.

### Similarities With Human Population Problems

Obviously, humans, if educated, can do something about their population problems while flies are "stuck" with their dilemma. However, this experiment permits teacher and student to do the following things:

- 1) Initiate some thinking and discussion about the human population problem and a discussion of the environmental crisis. Encourage observation and collection of data--two necessary components of the scientific method.

#### 1) Initiation of Thinking and Discussion

##### a) Suggested Topics

<u>Fly Culture</u>	<u>Comparison</u>	<u>Human Culture</u>
Bottle	Limited Environment	Earth
200-300	Maximum Population Size	28-32 Billion
4-6 Weeks	Time Required to Reach Maximum Population Size	100 years at present Growth Rate
Pollution Body Wastes Dead Bodies	Results of Overcrowding	Pollution Technology Air, Water, Soil, and Noise Pollution Human and Domestic Animal Wastes
Depletion of Food and Water Changes in Behavior Crowding Near Top of Bottle From Much Flying to Much Walking		Depletion of Natural Resources Changes in Behavior Crime-Violence-War Increased Infant & Maternal Mortality Decreased Life Span Overuse of National Parks Unemployment, Poverty, Illiteracy, Starvation
Decreased Size Because of Undernourishment		
How Population is Limited		
Death Control Famine Disease Accidents		Death Control Famine Disease Accidents War

Part C: To acquire background information, you may want to refer to your school's sociology textbook, or to one of the following sources. The Title III Environmental Education Center also has pertinent information on population.

1. Your legislative representatives
2. Your local school and public libraries
3. Reader's Guide to Periodical Literature
4. Population Reference Bureau, Inc.  
1755 Massachusetts Ave., N.W.  
Washington, D.C. 20036
5. Population Crisis Committee  
1730 K Street, N.W.  
Washington, D.C. 20006
6. Planned Parenthood - World Population  
810 Seventh Street  
New York, N.Y. 10012
7. International Planned Parenthood Federation  
18-20 Lower Regent Street  
London, S.W. 1  
England
8. Association for Voluntary Sterilization  
14 West 40th Street  
New York, N.Y. 10018
9. Zero Population Growth  
367 State Street  
Los Altos, California 94022
10. The Population Council  
245 Park Avenue  
New York, N.Y. 10017
11. Hugh Moore Fund  
603 East 42nd Street  
New York, N.Y. 10017

Latest statistics should be checked constantly. The most recent newspaper articles indicate the U.S. will soon reach "0" increase. However, there is still the rest of the world.

The following bogus bill is intended to stimulate interest and develop concern about the human population growth rate. However, before you decide to use this as a teaching aide, you must consider the students' preparedness to discuss this material. It is further advised that you construct any discussion situation on a voluntary basis.

A great deal of heavy discussion is expected. You should ask the students to discuss this as if they were a Congressman giving their arguments pro and con with substantiating statistics. Students will vote on the bill giving reasons for their vote.

The whole idea rests in the right of every American citizen to be represented and have a say in the control of his life.

IF THE STUDENTS ARE MADE TO THINK ABOUT AND DISCUSS POPULATION PROBLEMS, THEN THIS WILL BE A SUCCESS.

COPY OF SENATE BILL 869OP INTRODUCED INTO THE UNITED STATES SENATE  
BY SENATOR WARREN OATES OF MINNISINK COUNTY, KANSAS.

CONCOMITANT BILL 487P-1 INTRODUCED INTO THE HOUSE OF REPRESENTATIVES  
BY CONGRESSMAN PHIL JACKSON OF PEPIN COUNTY, IOWA.

WHEREAS the scientific community indicates a pending disaster for the  
United States is expected to occur within one generation,

WHEREAS the population of the United States will increase to a total  
of one billion by the year 2020,

WHEREAS we are currently unable to feed portions of our population,

WHEREAS we are currently unable to house portions of our population,

Sec. 1 BE IT RESOLVED that as of July 4, 1976, no female residing in  
the territorial limits of the United States shall be allowed to  
deliver more than two live offspring.

Subsection A: Any multiple births exceeding two shall be the sole  
exception.

Subsection B: Live offspring are those that survive a period of  
ninety days.

Sec. 2 Ninety days after the second delivery, or with the consent of  
the female at the time of the second delivery, a tubal ligation  
must be performed by any qualified physician in the United States  
at no cost to the patient,

Subsection A: All physicians performing such procedures must report  
such action to the District Office of Population Control within ten  
days on Form 609.31A.

Subsection B: Failure of any physician to comply with the above  
will have his license revoked for a period of not less than one year.

### Sec. 3 PENALTIES

1. Births occurring outside of a registered hospital must be reported  
to the District Office of Population Control within ten days of birth.

2. Penalties for nonreporting of said birth will be the immediate  
sterilization of that female.

3. If offspring upon discovery of this delivery are in excess of two,  
they will be handled as indicated in Part 4 of this section.

4. Any female subject to the provisions of this bill having offspring in excess of two (exception being Sec. 1, Subsection A), shall have the child (ren) removed by the District Office of Population Control - Federal Adoption Division.

Subsection A: Such female shall also be subjected to immediate sterilization.

Sec. 4 1. Abortions shall be provided by any registered hospital and/or any licensed physician upon demand of any female subject to this bill.

#### Sec. 5 FEDERAL BONUS FOR POPULATION CONTROL

1. Any married female between the ages of 18 and 40 may take a Federal Tax deduction of \$1,000 per anum per child that she has never delivered, up to a maximum of two.

2. Any married female adopting children may take a Federal Tax deduction of \$1,000 per anum per child adopted up to a maximum of two.

3. Parts 1 and 2 of this section may be combined.

#### Sec. 6 PENALTIES FOR MALE PROMISCUITY

1. Rape shall be a Federal Offense.

Subsection A: Any male convicted of rape will be subject to immediate sterilization in addition to any applicable prison terms.

2. Any married male impregnating a female other than his wife will be sterilized upon birth of live offspring.

## ENVIRONMENT Idea 1 Land

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### Action 5

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#### "Let's Go on a Field Trip!"

A field trip is to be taken during your teaching of the land unit. The field trip is an integral part of the land unit. It emphasizes the concepts learned, or to be learned by the students. On-the-spot observation is a valuable learning technique. Consult the "Teachers' Policy Handbook" for field trip dress, discipline, and general instructions.

#### A. Facts or Concepts?

Mind-filling, factual, see-all field trips have been a traditional approach to the field trip in the past. The question is, "Is the child given any responsibility for learning on his own?" Does he retain more from being spoon-fed facts or from being allowed to learn from his own interest and involvement?

Experience indicates that children learn more when they become personally involved in the learning process. This can be achieved by allowing the child to participate in the initial planning of the field trip, and to select a specific investigation on the field trip for which he will be responsible. These specific investigations will be within the bounds of the concepts to be presented on the field trip and in the unit.

The concepts below are only a few of the many that students should come to understand when learning about the environment. Additional concepts may be emphasized at the teachers' discretion. The concepts to be presented are as follows:

1. Man has learned to use his environment wisely in a number of ways.
2. Economy, through supply and demand, determines the amount and rate of resource use.
3. Environmental quality cannot always be defined in economic terms.
4. Living things are interdependent with each other and with their environment.

5. The government is active in the development and management of land.
6. Man is dependent on the renewable resources for his survival.
7. The growth of population and technology increases man's demands upon natural resources.

## B. Where Do We Go?

The above concepts can be illustrated at a number of field sites. The actual field trip site choice should result in a discussion with your students. Let the students feel a part of the final decision. Their interest will be enhanced by your concern over their choices.

Suggested field sites would include:

1. Local wooded area, e.g. Alton ravines; student's farm; school site nature area; or other sites
2. City park or county owned property
3. Pere Marquette State Park; Beaver Dam State Park; other nearby state parks
4. Local organizations; such as Pride, Inc. and industry
5. School campus.

## C. How Do We Teach Concepts?

Three options are presented for the teaching of these concepts. These options vary in degree of the student's responsibility for learning. They vary from teacher planning activities for the student to student-teacher planning to total student planning. These options can be combined or used independently. The options are as follows:

### 1. Teacher Planning for Student

The teacher will present activities to be assigned to students or chosen by the students on a voluntary basis. The students should be encouraged to brainstorm additional activities to enlarge on those being suggested. The only caution would be to contain the brainstormed activities as they apply to the concept being taught. Those activities are listed following this section on teaching options.

## 2. Student-Teacher Planning

With this procedure the list of concepts is to be presented to the students for class discussion. The discussion should establish an understanding of these concepts. At this point, the student should be guided into a brainstorming session to bring out field trip activities and assignments of same as related to the concepts. The teacher, in guiding the development of the field activities may care to provide some direction by giving suggestions of activities as they are listed at the conclusion of this teaching option section.

## 3. Student Planning

The student in this procedure will be totally responsible for his plan of study of the concepts given to him by the teacher. Initially, the teacher will work with the student in developing a study agreement. The study agreement will cover the following points:

- a. title of study
- b. questions to be answered in conducting the study
- c. resources to be used
- d. description of field activity
- e. field activity equipment and supplies
- f. method of recording data
- g. form the report or summary will take (written-oral-audio & visual))
- h. how and who will evaluate the report

The carrying out of the field activity may be either on a student self-directed basis on free time or as a part of the class field trip.

## Suggested Field Trip Activities

Due to the structure of secondary schools, field trips of less than one class period might be necessary. The following ideas are written considering this limitation. However, if half-day field trips are possible, the following ideas may be expanded.

Five groups of students should be formed; either by interest or ease of grouping. Each group should be held responsible for gathering data and presenting this data to the entire class. Adequate preparation is extremely important so the students can fulfill their data collection within one class period; or they can spend extra time on their own.

## GROUP I

### Ecology and the Land

1. A square meter quadrat study could be made of several areas. For example, the football field, front lawn, unmowed area, wooded area, or flower bed could be used. Determine the numbers of organisms, the species and their relationship with each other and the physical environment. Recording of weather conditions is important. Trace any food chains that unite these organisms. What role do these organisms play in soil fertility?
2. The kinds and amounts of minerals in the soil will help determine the quality of plant material. Use a soil testing kit to measure and study the kinds and amounts of these minerals. This equipment is available for your use through the Title III Environmental Education Center, 618-786-3313.
3. Composting to improve soil conditions should be studied. What is composting? How does it improve the quality of the soil? Does your school have a composting program using leaves and lawn cuttings? Start a small one on the school property and hold a demonstration for the administration.
4. Soil compaction and water absorption are important areas to study. Determining how fast soil absorbs water can be easily done using large coffee cans with both ends cut out. Place the coffee cans tightly in different soils and pour the water into the cans. Record the time for a specific quantity of water to be absorbed. Paths on the school property, the football field, or an undisturbed area can be tested. Would an easy solution to the problem of runoff on compacted soil be the installation of Astro-turf, or a similar product?

## GROUP 2

### Solid Waste Disposal

1. Survey school operations to determine the use of non-disposable, or ecological products among school supplies, plastics, and cafeteria supplies. Interviews with the administration and school personnel could be conducted. Tape recorders are available through the Title III Environmental Education Center, 618-786-3313. Is recycled paper purchased by your school system? Are bottles or milk cartons used in the cafeteria?
2. Are any recycling programs in operation by school organizations? Talk with the student body, clubs and organizations to see what can be done. Sell the recycling program to students, teachers, and parents. A list of recycling stations may be obtained through the Title III Environmental Education Center, 618-786-3313.
3. Solid waste disposal is an important issue. Things that cannot be recycled should be disposed of properly. Does the school use an incinerator? How effective is this incinerator in preventing air pollution? Or, does your school dispose of solid waste by means of a sanitary landfill? Calculate the disposal costs per year for your school building. Could the school save money by buying products that can be recycled? All the above questions should be answered by interviewing administrators and school personnel.

## GROUP 3

### Pesticides

1. Interview the custodian. Ask him what pesticides are used by the school. Ask to see the labels and record the information about the use of these pesticides and their chemical composition. Which ones are hard pesticides? Which ones are safe to use by competent applicators?
2. Find an area affected by pesticides, e.g. around the school building where herbicides have been used. Compare the "life" in this area with that in an unaffected area.

3. Are any natural controls being used on the school property? Suggest alternatives and present the list to your teacher and administrator. Suggest that your student council initiate a program using natural controls; e.g. planting marigolds and other plants that repel insects.
4. Conduct a survey of the number of individuals within a city block that use pesticides and/or natural controls. Prepare a short, easily answered questionnaire in class. Analyze your data and present the results to your teacher and class.

## GROUP 4

### Aesthetic Appreciation

1. Obtain a map of your entire campus. On the map, include areas of preserved beauty, land abuse, wildlife cover, historical significance, and recreation. Use pre-determined symbols. Analyze your data and make appropriate changes to include your concept of aesthetic values. Keep environmental quality in mind at all times. Present your suggested alternatives to your class, teacher, and administrator.

## GROUP 5

### Population

1. Determine the population density of your school in the years 1940, 1950, 1960, and 1970. To find density, divide the number of individuals by the number of square meters of the entire campus area. You will have to obtain the figures from the secretary or the administrator of your building.

Now figure the rate of density change. Use the formula  $R = \frac{\Delta D}{\Delta T}$ , rate equals difference in density (delta D) over difference in time (delta T). For example; if in 1930 the population density of your school was 0.12 per m<sup>2</sup> and in 1940 the population density was 0.23 m<sup>2</sup>, the rate of density change would be:  $R = \frac{0.23 - 0.12}{1940 - 1930} = \frac{0.11}{10} = 0.011$  people per m<sup>2</sup> per year.

What is the rate of density change over the last forty years? What effect does this rate have on class size, individual needs, and building programs? What environmental factors determine this density change? What is the projected enrollment in twenty years?

## ENVIRONMENT Idea | Land

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### Action 6

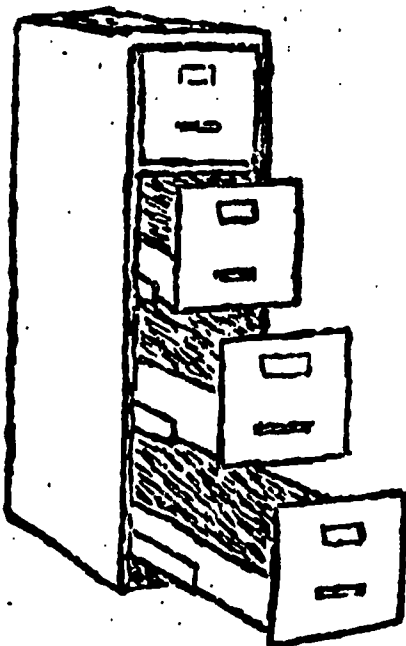
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#### "A Resource Key to Open the Mind"

Often teachers desire additional reading material, visual experiences or discussions to enrich a student's learning experiences. Listed below are materials which may be borrowed from the Environmental Project Center, area resource people, and free films. This listing, however, does not include resources which may be found in local school or public libraries.

#### A. Move Upward With the Vertical File

The Project Staff has accumulated and filed a number of pamphlets, newspaper clippings and magazine articles which are available to teachers for use as resource material. Teachers may borrow, for two weeks, a maximum of four articles from any one heading in the vertical file. Articles may be obtained by mail, by contacting one of the Project Staff or by calling the Project Center at 786-3313. The following headings appear in the vertical file.



1. Agriculture
2. Agricultural Pollution
3. Community Planning
4. Community Planning - Zoning
5. Conservation - Districts
6. Conservation - Soil
7. Conservation - Wildlife
8. Ecology
9. Forestry
10. Governmental Control -  
Federal - Pesticides

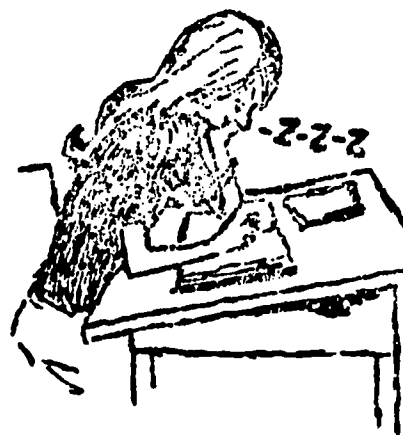
11. Hunting and Trapping
12. Insect - Control
13. Land
14. Landfill
15. Litter
16. Mines - Waste
17. Natural Resources
18. Pesticides
19. Plastics
20. Population

21. Recreation
22. Recreation - Illinois
23. Recreation - National  
Parks and Forests
24. Recycling
25. Soil
26. Solid Waste
27. Terrarium
28. Urbanization
29. Wildlife

## B. Enough for Each Student

The Project Center also has multiple copies of certain resource materials which may be borrowed by a class. If the teacher desires, and it is possible, each student may study his personal copy of a pamphlet for a maximum of two weeks. Such bulk requests should be directed to the Project Staff.

All of the material listed below was obtained free of charge. The teacher or school librarian may obtain permanent copies for their building or classroom by directing requests to the following agencies.



### 1. "America's Lifelines"

U. S. Department of Transportation  
Washington, D.C.

Federal Aid for highways

2. "Cans and the Environment"

American Can Co.  
Greenwich, Conn.

Questions and Answers Concerning Solid Waste and Recycling.

3. "Eleven Pennies for Better Hunting"

Wildlife Management Institute  
Wire Bldg.  
Washington, D.C.

How the Pittman-Robertson Wildlife Restoration Program spends its eleven cent tax from the sportman's gun and ammunition dollar.

4. "The Grower"

Reprinted from The Packer

Article encourages the use of pesticides, but lacks in statistical data.

5. "Pollution Facts/Report #3"

Continental Can Co.  
St. Louis, MO

Presents statistics and graphs concerning all forms of pollution.

6. "What Farmers Want You to Know About"

Top Operator, a publication of Farm Journal, Inc.  
230 W. Washington Square  
Philadelphia, Pa. 19105

Printed so consumers will know better what farmers are doing for them.

7. "What You Can Do About Environmental Problems"

Handout from the Sierra Club  
1050 Mills Tower  
San Francisco, Calif. 94104

8. "What's the Latest Word on Re-using Glass?"

American Trucking Assoc.  
Washington, D.C.

Frank Blain interviews R.L. Cheney, Executive Director, Glass Container Manufacturers Institute.

9. "Wildlife; the Environmental Barometer"

U.S. Department of the Interior  
Bureau of Sport Fisheries & Wildlife  
Washington, D.C. 24240

10. "The Problem/The Recommendations"

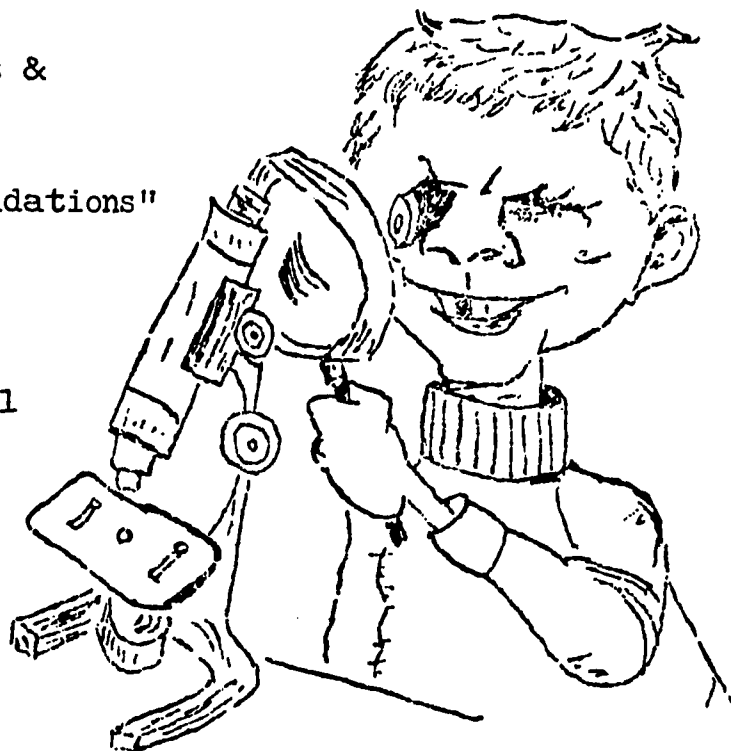
Reprint from Audubon  
1130 5th Avenue  
New York, NY 10028

Suggests the least harmful pesticides to use in the control of insects.

11. "Environmental Health Problems"

Public Health Service  
Department of Health, Education, & Welfare  
5600 Fisher's Lane  
Rockville, MD 20852

Effects of pollution upon human health.



## C. Investigate Your Classroom Resources

The following is a listing of possible resource people and their titles. You may want to contact one of these resource people about the possibility of speaking to your class. You may also wish to contact your local high school for students qualified to speak to your class.

### JERSEY COUNTY

John Pero, Extension Administrator  
Cooperative Extension Service, University of Illinois  
405 South State, Jerseyville, Illinois Phone: 618-498-4821

Walden Lewis, Area Forester  
Illinois Division of Forestry, Department of Conservation  
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

David Harper, Game and Fish Biologist  
Illinois Department of Conservation  
142 Robert Street, Jerseyville, Illinois Phone: 618-498-4243

Tom Lamer, District Forester  
Illinois Division of Forestry, Department of Conservation  
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

George Lessig, Fire Warden  
Illinois Division of Forestry  
124 West Pearl, Jerseyville, Illinois Phone: 618-498-2828

George Threldkeld, District Conservationist  
U.S. Department of Agriculture  
301 South Jefferson, Jerseyville, Illinois Phone: 618-498-3712

Ray Carter, Soil Conservation Technician  
U.S. Department of Agriculture  
301 South Jefferson, Jerseyville, Illinois Phone: 618-498-3712

Sue Wright, Park Interpreter  
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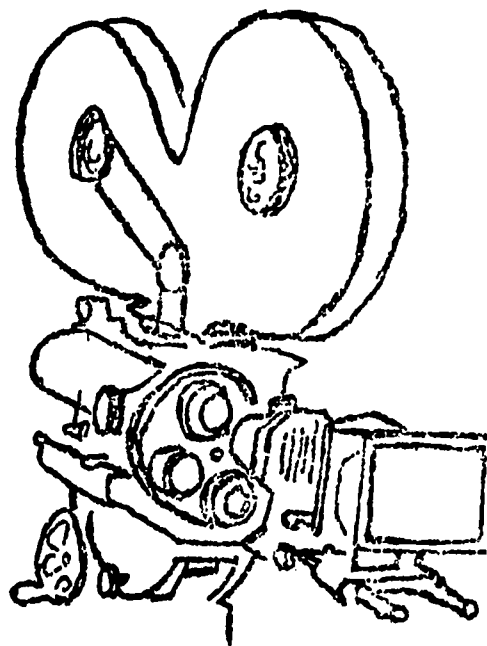
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# D. "I See and I Remember ..."

The following is a listing of free films which may be obtained if a teacher so desires. The films may be borrowed from the sources given below with the only cost involved being that of return postage. All films are in color except those designated by (\*) asterick.



TITLE OF FILM	SOURCE OF FILM	LENGTH
<p>"Conservation of Natural Resources"</p> <p>Analyzes our problem of wastes of timber, soil, minerals and wildlife</p>	<p>Film Loan Service Division of Education Ill. Department of Conservation State Office Bldg. Room 115 400 S. Spring Springfield, IL 62706</p>	12 min.
<p>"While There is Time"</p> <p>Story of our natural resources, conservation and activities of Izaak Walton League</p>	<p>The Izaak Walton League of America 1326 Waukegan Road Glenview, Illinois</p>	15 min.
<p>"Wealth of the Wasteland"*</p> <p>Story of research to recover and recycle valuable minerals</p>	<p>Motion Pictures Bureau of Mines 4800 Forbes Avenue Pittsburgh, Pa. 15213</p>	27 min.
<p>"So Little Time"</p>	<p>Murphy Oil Corp. El Dorado, Arkansas</p>	??

TITLE OF FILM	SOURCE OF FILM	LENGTH
<p>"The Trouble With Trash" (waste disposal problem)</p>	<p>Modern Talking Picture Service c/o Swank Motion Pictures, Inc. 201 South Jefferson Avenue St. Louis, Missouri 63103</p>	<p>28 min.</p>
<p>"The Farm"</p> <p>Farm management for maximum wildlife</p>	<p>Same as above</p>	<p>28 min.</p>